

What is claimed is:

1. An array for screening to identify conditions, compounds, or compositions that inhibit, prevent, induce, modify, or reverse transitions of physical state comprising at least 24 samples, each sample comprising a medium, wherein one or more of the samples comprises a disease-causing substance.
2. The array of claim 1, wherein each sample comprises the disease-causing substance.
3. The array of claim 1, wherein the disease-causing substance is in solid, liquid, or dissolved form.
4. The array of claim 1, wherein the medium is a liquid.
5. The array of claim 1, wherein the disease-causing substance is derived from an animal, plant, cell, or tissue.
6. The array of claim 1, wherein the medium is derived from an animal, plant, cell, or tissue.
7. The array of claim 1, wherein one or more of the samples further comprises one or more additional components.
8. The array of claim 7, wherein the additional component is a small molecule.
9. The array of claim 7, wherein the additional component is a large molecule.
10. The array of claim 1, comprising at least 48 samples.
11. The array of claim 1, comprising at least 96 samples.

12. The array of claim 7, wherein one or more of the samples differs from one or more other samples with respect to at least one of:

- (i) the identity or amount of one of the components;
- (ii) the physical state of one of the components;
- (iii) the identity or amount of the medium; or
- (iv) the pH.

13. The array of claim 7, wherein each of the samples differs from all the other samples with respect to at least one of:

- (i) the identity or amount of one of the components;
- (ii) the physical state of one of the components;
- (iii) the identity or amount of the medium;
- (iv) the pH;
- (v) gas composition; or
- (vi) temperature.

14. The array of claim 1, wherein the disease-causing substance is calcium phosphate, calcium carbonate, calcium pyrophosphate, brushite, apatite, hydroxyapatite, calcium oxalate, a kidney stone, bone tissue, magnesium ammonium phosphate, uric acid or a salt thereof, a gall stone, cholesterol, an amyloid protein, collagen, bilirubin or a salt thereof, dental plaque, dental calculus, protein structure, or a protein precipitate or a hydrate or a mixture thereof.

15. A method of preparing an array of at least 24 samples for screening to identify conditions, compounds, or compositions that inhibit, prevent, induce, modify, or reverse transitions of physical state comprising:

- (a) adding a medium to each of the samples; and
- (b) adding a disease-causing substance to at least one of the samples.

16. The method of claim 15, further comprising processing one or more of the samples to induce the transition of physical-state in the disease causing substance.

17. The method of claim 16, wherein processing comprises at least one of:

- (a) adjusting a time of incubation;
- (b) adjusting a temperature;
- (c) adjusting a pressure;
- (d) subjecting the samples to a nucleation event;
- (e) subjecting the samples to ultrasound, shock waves, laser energy, or mechanical stimulation;
- (f) adjusting an amount of a component
- (g) adding a component;
- (h) adjusting an amount of the medium; or
- (i) adjusting a gas composition.

18. The method of claim 15, wherein the disease-causing substance is added to each sample.

19. The method of claim 15, wherein the disease-causing substance is in solid, liquid, or dissolved form.

20. The method claim 15, wherein the medium is a liquid.

21. The method claim 15, wherein one or more of the samples further comprises one or more additional components.

22. The method of claim 21, wherein the additional component is a small molecule.

23. The method of claim 21, wherein the additional component is a large molecule.

24. The method of claim 15, the array comprising at least 48 samples.

25. The method of claim 15, the array comprising at least 96 samples.

26. The method of claim 21, wherein one or more of the samples differs from one or more other samples with respect to at least one of:

- (i) the identity or amount of one of the components;
- (ii) the physical state of one of the components;
- (iii) the identity or amount of the medium; or
- (iv) the pH.

27. The method of claim 21, wherein each of the samples differs from all of the other samples with respect to at least one of:

- (i) the identity or amount of one of the components;
- (ii) the physical state of one of the components;
- (iii) the identity or amount of the medium; or
- (iv) the pH.

28. The method of claim 15, wherein the disease-causing substance is calcium phosphate, calcium carbonate, calcium pyrophosphate, brushite, apatite, hydroxyapatite, calcium oxalate, a kidney stone, bone tissue, magnesium ammonium phosphate, uric acid or a salt thereof, a gall stone, cholesterol, an amyloid protein, collagen, bilirubin or a salt thereof, dental plaque, dental calculus, protein structure, or a protein precipitate or a hydrate or a mixture thereof.

29. A method of screening an array of at least 24 samples to identify conditions, compounds, or compositions that inhibit, prevent, induce, modify, or reverse transitions of physical state comprising:

- (a) preparing an array of at least 24 samples each sample comprising a medium and a disease-causing substance;
- (b) processing one or more of the samples to induce or reverse the transition of physical-state in the disease causing substance; and
- (c) analyzing the processed samples to detect the induction or reversal of the transition in physical state.

30. The method of claim 29, wherein the disease-causing substance is in solid, liquid, or dissolved form.

31. The method claim 29, wherein the medium is a liquid.

32. The method of claim 29, wherein processing comprises at least one of:

- (a) adjusting a time of incubation;
- (b) adjusting a temperature;
- (c) adjusting a pressure;
- (d) subjecting the samples to a nucleation event;
- (e) subjecting the samples to ultrasound, shock waves, laser energy, or mechanical stimulation;
- (f) adjusting an amount of a component
- (g) adding a component;
- (h) adjusting an amount of the medium; or
- (i) adjusting a gas composition.

33. The method claim 29, wherein one or more of the samples further comprises one or more additional components.

34. The method of claim 33, wherein the additional component is a small molecule.

35. The method of claim 33, wherein the additional component is a large molecule.

36. The method of claim 29, the array comprising at least 48 samples.

37. The method of claim 29, the array comprising at least 96 samples.

38. The method of claim 33, wherein one or more of the samples differs from one or more other samples with respect to at least one of:

- (i) the identity or amount of one of the components;
- (ii) the physical state of one of the components;
- (iii) the identity or amount of the medium;
- (iv) the pH; or
- (v) the gas composition.

39. The method of claim 33, wherein each of the samples differs from all of the other samples with respect to at least one of:

- (i) the identity or amount of one of the components;
- (ii) the physical state of one of the components;
- (iii) the identity or amount of the medium;
- (iv) the pH; or
- (v) the gas composition.

40. The method of claim 29, wherein the disease-causing substance is calcium phosphate, calcium carbonate, calcium pyrophosphate, brushite, apatite, hydroxyapatite, calcium oxalate, a kidney stone, bone tissue, magnesium ammonium phosphate, uric acid or a salt thereof, a gall stone, cholesterol, an amyloid protein, collagen, bilirubin or a salt thereof, dental plaque, dental calculus, protein structure, or a protein precipitate or a hydrate or a mixture thereof.

41. The method of claim 29, wherein the processed samples are analyzed to detect a solid or an absence of a solid.

42. The method of claim 29, wherein the processed samples are analyzed by visual inspection, video optical microscopy, image analysis, optical microscopy, or polarized light analysis.

43. The method of claim 41, wherein the processed samples are analyzed to determine if the solid is amorphous or crystalline.

44. The method of claim 41, further comprising analyzing the detected solid by infrared spectroscopy, near-infrared spectroscopy, Raman spectroscopy, NMR, x-ray diffraction, light microscopy, second harmonic generation, or electron microscopy.

45. The method of claim 41, further comprising analyzing the detected solid by differential scanning calorimetry or thermal gravimetric analysis.

46. The method of claim 29, the array comprising at least 48 samples.

47. The method of claim 29, the array comprising at least 96 samples.

48. The method of claim 29, wherein at least about 100 samples are screened per day.

49. The method of claim 29, wherein at least about 1000 samples are screened per day.

50. The method of claim 29, wherein at least about 10,000 samples are screened per day.

51. A method to discover conditions, compounds, or compositions that prevent or inhibit crystallization, precipitation, polymerization, or deposition of a disease-causing substance, or promote depolymerization comprising:

- (a) preparing an array comprising at least 24 samples each sample comprising a medium and one or more components to induce a disease-causing substance;
- (b) processing one or more of the samples to induce crystallization, precipitation, or deposition of the disease-causing substance;
- (c) screening the array by analyzing the processed samples to detect the absence of crystallization, precipitation, polymerization, depolymerization, or deposition of the disease-causing substance; and
- (d) selecting the samples wherein crystallization, precipitation, polymerization, depolymerization, or deposition of the disease-causing substance did not occur to identify the conditions, compounds, or compositions.

52. The method of claim 51, wherein the sample comprises the disease-causing substance in dissolved form.

53. The method claim 51, wherein the medium is a liquid.

54. The method claim 51, wherein one or more of the samples further comprises one or more additional components.

55. The method of claim 54, wherein the additional component is a small molecule.

56. The method of claim 54, wherein the additional component is a large molecule.

57. The method of claim 51, the array comprising at least 48 samples.
58. The method of claim 51, the array comprising at least 96 samples.
59. The method of claim 51, wherein processing comprises at least one of:
- (a) adjusting a time of incubation;
  - (b) adjusting a temperature;
  - (c) adjusting a pressure;
  - (d) subjecting the samples to a nucleation event;
  - (e) subjecting the samples to ultrasound, shock waves, laser energy, or mechanical stimulation;
  - (f) adjusting an amount of a component
  - (g) adding a component;
  - (h) adjusting an amount of the medium; or
  - (i) adjusting a gas composition.
60. The method of claim 54, wherein one or more of the samples differs with respect to at least one of:
- (i) the identity or amount of one of the components;
  - (ii) the physical state of one of the components;
  - (iii) the identity or amount of the medium;
  - (iv) the pH; or
  - (v) the gas composition.
61. The method of claim 54, wherein each of the samples differs from all of the other samples with respect to at least one of:
- (i) the identity or amount of one of the components;
  - (ii) the physical state of one of the components;
  - (iii) the identity or amount of the medium;
  - (iv) the pH; or
  - (v) the gas composition.



62. The method of claim 52, wherein the disease-causing substance is calcium phosphate, calcium carbonate, calcium pyrophosphate, brushite, apatite, hydroxyapatite, calcium oxalate, a kidney stone, bone tissue, magnesium ammonium phosphate, uric acid or a salt thereof, a gall stone, cholesterol, an amyloid protein, collagen, bilirubin or a salt thereof, dental plaque, dental calculus, protein structure, or a protein precipitate or a hydrate or a mixture thereof.

63. The method of claim 51, wherein at least about 100 samples are screened per day.

64. The method of claim 51, wherein at least about 1,000 samples are screened per day.

65. The method of claim 51, wherein at least about 10,000 samples are screened per day.

66. A method to discover conditions, compounds or compositions that promote dissolution, destruction, or breakup of a disease-causing substance, comprising:

- (a) preparing an array comprising at least 24 samples each sample comprising a medium and the disease-causing substance;
- (b) processing one or more of the samples to induce the dissolution, destruction, or breakup of the disease-causing substance;
- (c) screening the array by analyzing the processed samples to detect the dissolution, destruction, depolymerization, or breakup of the disease-causing substance; and
- (d) selecting the samples wherein the dissolution, destruction, depolymerization, or breakup of the disease-causing substance occurred to identify the conditions, compounds, or compositions.

67. The method of claim 66, wherein the disease-causing substance is in undissolved form.

68. The method claim 66, wherein the medium is a liquid.

69. The method of claim 66, wherein processing comprises at least one of:

- (a) adjusting a time of incubation;
- (b) adjusting a temperature;
- (c) adjusting a pressure;
- (d) subjecting the samples to a nucleation event;
- (e) subjecting the samples to ultrasound, shock waves, laser energy, or mechanical stimulation;
- (f) adjusting an amount of a component
- (g) adding a component;
- (h) adjusting an amount of the medium; or
- (i) adjusting a gas composition.

70. The method claim 66, wherein one or more of the samples further comprises one or more additional components.

71. The method of claim 70, wherein the additional component is a small molecule.

72. The method of claim 70, wherein the additional component is a large molecule

73. The method of claim 66, the array comprising at least 48 samples.

74. The method of claim 66, the array comprising at least 96 samples.

75. The method of claim 70, wherein one or more of the samples differs with respect to at least one of:

- (i) the identity or amount of one of the components;
- (ii) the physical state of one of the components;
- (iii) the identity or amount of the medium;
- (iv) the pH; or
- (v) the gas composition.

76. The method of claim 70, wherein each of the samples differs from all of the other samples with respect to at least one of:

- (i) the identity or amount of one of the components;

- (ii) the physical state of one of the components;
- (iii) the identity or amount of the medium;
- (iv) the pH; or
- (v) the gas composition.

77. The method of claim 66, wherein the disease-causing substance is calcium phosphate, calcium carbonate, calcium pyrophosphate, brushite, apatite, hydroxyapatite, calcium oxalate, a kidney stone, bone tissue, magnesium ammonium phosphate, uric acid or a salt thereof, a gall stone, cholesterol, an amyloid protein, collagen, bilirubin or a salt thereof, dental plaque, dental calculus, protein structure, or a protein precipitate or a hydrate or a mixture thereof.

78. The method of claim 66, wherein at least about 100 samples are screened per day.

79. The method of claim 66, wherein at least about 1,000 samples are screened per day.

80. The method of claim 66, wherein at least about 10,000 samples are screened per day.